Knowledge, Attitude, and Practice of Antibiotics Usage among Dairy Farmers of Chattogram

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ABSTRACT

Antibiotics are commonly used in dairy farms of Bangladesh for treating bacterial diseases. However, frequent misuse of antibiotics results in the development of Antimicrobial resistance (AMR). A study was carried out to determine dairy farmers' knowledge, attitude, and practices (KAP) regarding antibiotics usage (AMU) in the Chattogram district. A total of 30 dairy farms were selected randomly for the study. Data were collected from the farmers through face-to-face interviews with a pre-structured questionnaire. The study showed that most of the farm owners (53.3%) completed graduation and 83.0% of them knew about antimicrobial resistance. About half (50%) of the farm owners maintained the proper antibiotic withdrawal period. Surprisingly, 24% of the participants thought that antibiotics could be used as growth promoters in the livestock sector. Most of the farm owners (86.7%) fulfilled the course of antibiotics while treating an animal, whereas only 13.3% of farmers stopped using antibiotics as soon as their animals recovered. We found that 70% of the farmers use antibiotics following the veterinarian’s instructions. The findings of this study provide an understanding of the knowledge, attitudes, and practices (KAPs) of dairy farmers regarding antibiotic use. Dairy farmers in Bangladesh have a poor level of awareness related to antibiotic usage on their farms. Which creates threats to public health because of the rise in resistant microorganisms. Therefore, it is now very crucial to take action to safeguard future generations from antimicrobial resistance by creating more awareness among dairy farmers.

Keywords: Antibiotics, Antimicrobial resistance, Chattogram, Dairy Farmers, KAP

CHAPTER I

INTRODUCTION

The economy of Bangladesh is mostly dependent on agriculture and Livestock plays a vital role in it. Livestock contributes to food security, balanced diet, and unemployment problems and also generates foreign exchange, empowers women, and creates self-employment opportunities (Seraj, 2022) The rural economy and farmers' livelihoods depend heavily on their livestock. In the nation's customary mixed agriculture of crops and cattle, dairy cows are vital (Waters-Bayer & Bayer, 1992).

In recent years, there has been an increasing trend of dairy cattle farming in Bangladesh. However, it also faces numerous challenges and infectious diseases are one of them. Despite the huge growth in sectors, many farmers in Bangladesh are still unaware of dairy management particularly how to prevent infectious diseases and how to deal with when their cattle are affected (Moller et al., 2023).

The drugs of choice for treating bacterial infections in humans and animals are antibiotics, which have a broad range of chemical and biological characteristics. Many dairy farmers use antibiotics as preventive measures, growth promoters, and increasing animal feed efficiency without sufficient knowledge of the ethical use of antibiotics. Moreover, they do not seek any guidance and help from veterinarians (Manyi-Loh et al., 2018).

Because of the ongoing livestock revolution, antimicrobial use (AMU) in the livestock industry is increasing daily especially in middle and low-income countries, due to the increasing demand for animal-source food and livestock farmers also wanting quicker growth to maximize their profit (Hossain et al., 2022).

Indiscriminate and irrational use of antibiotics in dairy sectors helps accumulation of drug residues in animal-originated food items and the development of antimicrobial-resistant microbes (AMR) in multiple sectors such as human health, animal health and animal production, aquaculture, and agriculture (Manyi-Loh et al., 2018).

Previous research shows that farmers are responsible for 53% of antimicrobial resistance (AMR) in the Livestock Sector in the United Kingdom (Borelli et al., 2023).

Due to a lack of knowledge, attitude, and practice among the farmers, they are using antibiotics without a prescription (Benavides et al., 2021). AMR has grown fast in the previous decade, becoming a global problem that eventually leads to treatment failure in humans and animals. The rise of AMR poses a severe threat to public health worldwide due to a lack of legal low-force acts and regulations and farmer self-prescription (WHO, 2023). To our knowledge, very few researches have been conducted on farmers regarding antibiotic usage in dairy cattle farming. Therefore, the objective of our current study was to investigate the knowledge, attitude, and practices of antibiotic usage among dairy cattle farmers of Chattogram.

CHAPTER II

MATERIALS & METHOD

2.1 Study area

The study was conducted in the Chattogram district of Bangladesh, which includes dairy cattle farms in both metropolitan areas and non-metro areas (Boalkhali, Patiya, Anwara, Banshkhali & Chandanish) of Chattogram. Chattogram is located in the south-eastern part of Bangladesh and is considered the business capital of Bangladesh. There is an increasing trend of dairy cattle farming in Chattogram.

2.2 Study design

A descriptive epidemiological study was conducted between February and May of 2024. A well-structured and pretested questionnaire has been used to collect data from the dairy farmers. Medium and large-size dairy farmers were given priority. A total of 30 dairy farmers were chosen randomly and surveyed for this study.

2.3 Questionnaire design and data collection

Data was collected through face-to-face interviews with farmers. The questionnaire was prepared in English and translated into Bengali for easy understanding of the farmers. Farmers were not informed of the study's goal to prevent response bias. The questionnaire consists of four sections and 30 questions. In the first section of the survey, demographic and socioeconomic information was gathered; in the 2^{nd}, 3^{rd}, and 4^{th}sections comprised questions related to knowledge, attitudes, and practices of antimicrobial usage among dairy farmers. Data were collected mainly on two categories of close-ended including yes and no questions.

2.4 Data analysis

The collected data were sorted and imported into Microsoft Excel 2016. Descriptive statistics were adopted with IBM SPSS Statistics 23, mainly to estimate the frequency and percentages of different variables selected as per the objective of the study.

CHAPTER III

RESULT

3.1 Overview of Dairy Cattle Farmers in Chattogram

The overview of dairy cattle farmers is shown in **Table 1**. The study shows the average age of all participants was 42 years. The average farming experience of all dairy farmers was 6.5 years, while the maximum experience was 20 years. The average monthly income of the farmers was 257.69 USD and the average herd size was 19.

Table 1. Overview of dairy farmers

Category	Median (Minimum, maximum)
Age	42 (27, 61)
Farming experiences	6.50 (2, 20)
Income	257.69 (128.85, 2576.95)
Herd size	19 (7, 70)

3.2 Demographic and socioeconomic characteristics of the dairy farmers in Chattogram

The demographic and socioeconomic status of the dairy farmers in Chattogram is shown in **Table 2**. Among the 30 participants, 60% of the dairy farmers were adults (25-44 years), and 53.3% of farm owners completed graduation. Most of the farm owners (40%) had less farming experience (1-5 years). At least 80% of the farms were intensive type.

Table 2. Demographic and socioeconomic characteristics of the dairy farmers (N=30) in Chattogram

variables	Categories	Frequency (n)	Percentage (%)
Age	Adult	18	60
	Aged	12	40
Education level	Primary	5	16.7
	Secondary	9	30.0
	Graduation	16	53.3
Farm Location	Metro area	19	63.3
	Non- metro area	11	36.7
Farming experience	(1-5) y	12	40.0
	(6-10) y	8	26.7
	(11-15) y	9	30.0
	>15 y	1	3.3
Monthly income(USD)	<1000 USD	23	76.7
	>1000 USD	1	3.3
Farm type	Intensive	24	80
	Semi-intensive	6	20
Herd size	(1-30)	25	80
	(31-60)	5	16.7
	>60	1	3.3

3.3 Knowledge of Dairy farmers (N=30) towards AMU and AMR

The knowledge characteristics of dairy farmers regarding antibiotic use and AMR status are summarized in **Table 3**. All the farm owners heard the term "Antibiotic". Almost 83% of the participants know about antibiotic resistance and 73.3% of participants believe that prolonged and unnecessary antibiotic use can lead to antibiotic resistance. Almost 93% of respondents believe that antibiotic is used to cure infection against bacteria. Surprisingly, 70% of farm owners believe that antibiotics work against diseases caused by viruses. About 50% of farm owners have a strong belief that antibiotics can be used without maintaining any withdrawal period. Near 97% of farm owners believe that antibiotics can be used in any dose and duration. The majority of the farm owners (90%) had the belief that antibiotics do not work as painkillers and 70% of farmers had the idea that any disease cannot be treated with antibiotics. Most of the farmers were not aware of any guidelines or regulations regarding antibiotic usage in dairy farms.

Table 3. Knowledge of Dairy farmers towards AMU and AMR (N=30)

Variables	Categories	Frequency(n)	Percentage (%)
Ever Heard the term "Antibiotics"	yes	30	100
	no	0	0
Know about antibiotic resistance	yes	25	83.3
	no	5	16.7
Prolong or unnecessary antibiotic use can lead to antibiotic resistance	yes	22	73.3
	no	8	26.7
Any antibiotic can be used in dairy farms as a preventive measure	yes	6	20.0
	no	24	80.0
Antibiotics can be used to cure infections caused by bacteria	yes	28	93.3
	no	2	6.7
Antibiotics can be used to cure infections caused by viruses	yes	21	70.0
	No	9	30.0
Antibiotics can be obtained without a prescription at pharmacies	yes	18	60.0
	No	12	40.0
Antibiotics can be used without maintaining a withdrawal period	yes	12	40.0
	No	18	60.0
Antibiotics can be used at any dose and duration	yes	1	96.7
	No	29	3.3
Aware of any guidelines or regulations regarding antibiotic usage in dairy farms	yes	5	16.7
	No	25	83.3
Any disease can be treated by using antibiotics	yes	9	30.0
	No	21	70.0
Antibiotics work as painkillers	yes	3	10.0
	No	27	90.0

3.4 Attitudes of Dairy farmers towards AMU and AMR

Farmers' attitudes towards AMU and AMR are shown in **Table 4**. In this study, the majority of farmers agreed that antibiotic resistance is a global problem including Bangladesh, which was 90%, and every farm owner agreed that antibiotic resistance could affect the health of their animal. About 77% of the farm owners were aware of the necessity to consult a veterinarian before applying antibiotics.

Most of the farm owners think that vaccination is better than using antibiotics. About 84% of dairy farm owners agreed to the proposal of the necessity of establishing a "rational use of antibiotic training for farmers". Half of the farm owners maintain the antibiotic withdrawal period before selling their livestock. About 24% of the participants think that antibiotics can be used as growth promoters in the livestock sector. Around 90% of the farmers believe that everyone should complete the entire course of antibiotics to prevent AMR development.

Table 4. Attitudes dairy farmers towards AMU and AMR (N=30)

Variables	Categories	Frequency(n)	Percentage (%)
Antibiotic resistance is a global problem including in Bangladesh	yes	27	90.0
	no	3	10.0
Antibiotic resistance can affect the health of your animal	yes	30	100
	no	0	0
It is necessary to know information on the proper use of antibiotics before applying them	yes	30	100
	no	0	0
It is not necessary to consult a veterinarian before using antibiotics	yes	7	23.3
	no	23	76.7
Antibiotics are better than vaccination	yes	2	6.7
	no	28	93.3
It is necessary to establish a "rational use of antibiotics" training for farmers	yes	25	83.3
	No	5	17.7
It is better to invest more in biosecurity to reduce the widespread use of antibiotics	yes	25	83.3
	No	5	17.7
Following the antibiotics withdrawal period before selling livestock	Yes	15	50.0
	No	15	50.0
It is important to use antibiotics as growth promoters in livestock production	yes	7	23.3
	No	23	76.7
Everyone should complete the entire course of antibiotics to prevent AMR development	yes	27	90.0
	No	3	10.0

3.5 The practice of dairy farmers towards AMU and AMR.

The practice of dairy farmers towards AMU and AMR in Chattogram is shown in **Table 5**. Most of the farm owners (86.7%) fulfil the course of antibiotics whereas only 13.3% of farmers stop using antibiotics as soon as their animals recover. Among all participants in this study, 70% of the farmers did not use antibiotics without a veterinarian's instructions, and 30% used antibiotics based on their prior experience. Almost 97% of farm owners use antibiotics at prescribed doses and duration and 86.7% of the participants vaccinate their animals to reduce the use of antibiotics

Table 5. The practice of dairy farmers towards AMU and AMR (N=30)

Variables	Categories	Frequency(n)	Percentage (%)
Stop the use of antibiotics as soon as your animal recovers	yes	4	13.3
	no	26	86.7
Use antibiotics without the veterinarian's instructions	yes	21	70.0
	no	9	30.0
Use antibiotics on livestock based on your prior experience	yes	9	30.0
	no	21	70.0
Check the expiration date of antibiotics before using	yes	26	86.7
	no	4	13.3
Use antibiotics as prescribed dose and duration	yes	29	96.7
	no	1	3.3
Through the expired and unused antibiotics on the ground	yes	18	60.0
	No	12	40.0
Vaccinate animals to reduce the use of antibiotics	yes	26	86.7
	No	4	13.3
Maintain regular antibiotic therapy as a preventive measure	Yes	14	46.7
	No	16	53.3
Maintain basic hygiene at the farm to prevent disease	yes	22	73.3
	No	8	26.7
Buy antibiotics from field-level drug representatives	yes	13	43.3
	No	17	56.7

CHAPTER IV

DISCUSSION

In Bangladesh, dairy farming is a significant and promising agricultural industry. The improper use of antibiotics in the dairy sector and the subsequent emergence of antimicrobial resistance (AMR) have negative impacts on the health of people, animals, and the environment. The knowledge, attitude, and practices (KAP) of Dairy farm owners about AMU, AMR, and at the farm level were studied in this study. The research described the demographic and socio-economic information of farmers. The study revealed that around 53% of the farm owner completed their graduation in different fields. Recent studies in Bangladesh showed that the farmers' knowledge, and attitudes on dairy farming are positively correlated with their level of education. (Rahman et al., 2021a). This finding positively correlates with our study. Most of the farmers have 1-5 years of farming experience; it also has a strong correlation with the dairy farmers' KAP toward AMU. The more farming experience they have, the more aware they will be of antimicrobial usage. The average demographic and socio-economic picture of dairy farmers was similar to several previous studies (Haque, 2021; Shaparan, 2022).

Our investigation revealed that the use of antibiotics was common in commercial large and small-scale dairy farms, with almost all dairy farm owner (100%) giving their animals antibiotics. It is a positive finding that almost 83% of the farm owners heard the term "Antibiotic resistance", which was much less in a previous similar type of study (55%) (Tasmim et al., 2023). However, a maximum portion of the owners could not give detailed information about AMR in this research.

The use of antibiotics in animals has been described in the absence of any clinical signs, from maintaining an animal to growth promoters. Antibiotic sales and self-medication without a veterinarian's prescription are thoroughly practiced, though in our research 70% of farm owners had an ideology about using antibiotics with veterinarians' instructions. Our findings correspond with a previous study held in the UK where more than 80% of the farm owners used antibiotics with a veterinarian's instruction (Ozturk et al., 2019).

Though our study indicates that the level of knowledge about antibiotic awareness is in**c**reasing day by day, in the case of attitude and practices there are still some issues

to be addressed. In our study, almost half of the dairy farmers do not maintain an antimicrobial withdrawal period before selling their livestock, which also causes the accumulation of antibiotic residue in meat and milk, and is one of the major reasons for developing AMR and other public health Risks (Rahman et al., 2021b). However, almost 90% of dairy farm owners believe that everyone should complete the entire course of antibiotics to prevent AMR development.

The majority of farmers have used antimicrobials for preventative and therapeutic purposes in the livestock industry (Hossain et al., 2022). However, in our study, only around 24% of the participants thought that antibiotics could be used as growth promoters in the livestock sector.

It is alarming that almost 84% of the participants in this study were not aware of any guidelines and regulations regarding antibiotics usage in dairy farms and 60% of the dairy farmers dispose the expired and unused antibiotics on the ground, which could also be a major reason for developing AMR. In this study, most of the farmers did not receive any training program regarding the “rational use of antibiotics”. Farmers' irrational use of antibiotics may be related to factors such as inadequate education, training, or knowledge regarding antibiotic misuse. Besides, a lack of monitoring from governmental agencies was previously known as a factor in why farmers do not follow antimicrobial withdrawal periods (Tasmim et al., 2023).

The study revealed that 30% of the farmer use antibiotics on livestock based on their prior experience. Almost 44% of the farm owners buy antibiotics from field-level drug representatives. These findings are also a matter of worry in controlling antimicrobial resistance in our country.

However, as of now, Bangladesh lacks an antimicrobial stewardship program that is in line with the country's strategy for reducing the use of antibiotics in food animals. A National Action Plan has been developed by the Ministry of Health and Family Welfare (2017–2022) to contain AMR in Bangladesh, but unfortunately, limited action has been taken (Ahmed et al., 2022). According to a recent ruling by Bangladesh's High Court Division of the Supreme Court, sales of antibiotics should only be conducted with a verified physician's prescription (Report, 2019).

CHAPTER V

CONCLUSION

The demographic and socio-economic status like the farmer's age, education, and experience plays a vital role in the proper use of antibiotics and suitable management of the farm. In addition, implementing a thorough regulatory strategy for the use, marketing, and prescription of antibiotics contributes to reducing antimicrobial overuse and resistance. It is required to make effective governance, motivation, and training programs to enhance farmers' knowledge, attitudes, and practices regarding this field. Farmers should be trained with proper regulatory guidelines for antibiotic usage, biosecurity management, and proper agriculture hygiene.

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The Author

BIOGRAPHY

I am Tarakmoy Das, son of Jaharlal Das and Shikha Das. I passed my Secondary School Certificate Examination in 2016 from Nasirabad Govt. High School followed by Higher Secondary Certificate Examination in 2018 from Hazera Taju Degree College. Currently, I am serving as an intern doctor under the Faculty of Veterinary Medicine at Chittagong Veterinary and Animal Sciences University. I aspire to spend my future caring for animals as a veterinarian. I am interested in working as a field veterinarian and conducting research in the public health sector.